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SAVAGES I HAVE KNOWN.

THE NEGRO.

My recollections of savagery on the Spanish Main are so numerous and so varied that I find myself really embarrassed in making a selection. In a certain sense of the word, nine in ten of the population between the Gulf of Mexico and the borders of Peru might be called savages, excepting here and there the dwellers in a little oasis of civilisation, such as Vera Cruz, Greytown, and Aspinwall on one coast, San Juan del Sur and Panama on the other. But it is of real barbarians I propose to treat, not of that very large class who may be conventionally so defined. Of such, then, there are three types noticeable in Spanish America —the Indian, commonest; the meztizo, or ladrone, the mixed blood; and the negro, exceedingly rare. I shall take the third of these for my first example.

All through Central America, from the States' frontier to the Panama Railway, exclusive of the population dwelling on the latter boundary, negroes of pure blood are not common. There never was any large proportion of slaves in that quarter of the world, except in Mexico and San Salvador; and, to their honour be it told, the very first act of these despised republics, when, in 1821, the blighting authority of Spain was overturned, declared slavery or peonage in any form opposed to the rights of man and the will of God. This act, however, though a just cause of pride to the people of Central America, was doubtless facilitated in its passage by the fact that very few persons were held in such bondage, and by the absence of any powerful interest hostile to it. From one reason or another, the negro seems not to have been regarded here with that antipathy commonly found in a white population brought closely into contact with him. His freedom proclaimed, he was immediately 'miscegenated,' as the Yankees say; and though the marks of his blood are common enough among all classes of society, the thoroughbred African himself has become rare. On the Atlantic coast, indeed, are found a few small colonies of emigrants, creole blacks from St Thomas and Jamaica; and here and there is a settlement of that curious and interesting race, the Carib, of which people I am bound to declare that its males rival the Chinese in industry, and in honesty surpass all the world; while its females are so invariably chaste as to have given a proverb to the dissolute population, which their good example cannot shame into decency or good conduct. Whatever was the blood of these Caribs when deported, in 1796, to the island of St Vincent, by the English governor of Belize, they are now undistinguishable in any way from the pure negro stock, and the name of 'Carib' still clinging to them is obviously a false description. Nevertheless, they are not likely to surrender it, for that name now carries a dignity and repute more valuable than passports or testimonials. 'I Carib man, sah!' says a black fellow who comes for employment, standing upright before you, with a conscious pride of race and good name in his eyes; and if, on inquiry, his boast is found to be the truth, it only remains to settle wages and terms. A Carib's honesty and skill are among the self-evident verities of nature. But I must not dwell on this people, most interesting though it be, for not among such does one find a savage.

But Joe, or Joe'm, as he called himself, was undoubtedly a savage. Perhaps I ought to say something of my hero's birth and parentage, and I would with pleasure if I only knew anything. It is possible poor Joe had vague recollections of 'where his rude hut by the Niger lay,' but nobody seemed to care much about the matter, nor about any other sentimental feelings of Joe; indeed, summoning my memory to account, I am almost ashamed to find how very little I knew of the honest fellow in his capacity of individual. Joe was to me a realisation, an embodiment of the wood-spirit; he was more like to 'Man, the King of Animals,' than any shikari I ever met. To see Joe stalking through the dim aisles of forest, his

lithe figure, clad in flannel rags patched with fur, bending and swaying as though twisted with colic; his great feet treading noiselessly among rotten sticks and dry leaves; his eyes rolling round and round beneath ferocious brows; his thick lips twisting and twining all the while—to see Joe thus was to behold a somewhat startling apparition. But yet more impressive was my guide when his quick hearing thought to catch the 'chump, chump, chumping' of a wild boar's tusks against a tree-trunk, half a mile away. When that sound reached him, he paused suddenly, and his great shapeless ears literally erected themselves like those of a dog. He always leaned against a tree to listen, closed his eyes, opened his mouth, and, as one could see, concentrated every faculty of his strange mind on the one sense of hearing. His ears really moved. Then, if the distant sound proved to be no fancy, it was grand to watch Joe's stealthy action: no wild beast could move more silently, or with a keener instinct of the best approach. I was never tired of contemplating my guide, and to this intense admiration of Joe in his business capacity it is, I think, to be attributed that I inquired so little of his private life. My talks with him were almost exclusively of game and wild adventure. But beyond doubt, now that the question occurs to me, Joe must have had a local habitation, if not a home, somewhere. I put the home in doubt, because that sacred word implies the presence of a wife, or at least of woman in some capacity; and I chance to know that this indefatigable hunter had but a desolate hearth, wherever it might be, for I remember well a conversation I had with him on this subject.

He was telling me something of his history, as we sat upon a fallen cotton-tree. Joe's language was the most extraordinary patois I ever heard, and utterly impossible to be rendered; in mentioning that 'woman' was pronounced by him as 'wah'n,' with a strong aspirate, I shall give not the most curious example of his utterance. He had been telling me how he was born, no one knew where, in the interior of Africa: that he was captured, he didn't know why or by whom, and taken as a slave down to the coast: that he was there embarked, after an unknown time, aboard a ship of undiscovered nationality: that the ship was captured at sea, under circumstances of which he had not been able to get any explanation: that in process of time, by events entirely outside his control or knowledge, he had been landed at a spot which, since he left it, had been identified to him as Sierra Leone, or Sarah Leh'n, as Joe preferred to call it: that people 'had talked to him' there (here Joe evidently alluded to the missionaries): that he had been very happy, hunting in the woods and otherwise following his vocation, poor savage, until a gentleman of an unknown nationality had taken possession of him for unknown purposes and by unknown rights, and carried him to sea again, much to Joe's horror; for he had a wild-beast memory of anything that had been disagreeable or hurtful to him: that when a few days were passed, he was set to do tasks wholly opposed to his instincts, and was cruelly treated on failure: that, once more, he was rescued 'by an English captain, bless him!'—Joe began to know his friends and foes a little now, after an education of kicks and oaths!—and was landed, at his own request, in one of the West India isles, whence he had found his way to the mainland, where game is plentiful.

This was Joe's story—confused, inexplicable, a very chaos of incident unintelligible, but, in truth, the most pathetic tale ever I heard. To me, sitting, as is my wont from time to time, with the portrait of this poor fellow in hand, the blood seems suddenly to rise and boil at my heart, thinking of the story. I recall the broken sentences in which he told it—the rambling, muddled style; the down-trodden attitude he unconsciously assumed, as memory brought back those days of uncomprehended suffering. It was, I think, Joe's utter inability to understand why, how, where these things happened to him, which gave such a terrible pathos to the tale. He, made in God's image, a man most brave and true and kindly, had been buffeted about the world, with no more comprehension of cause or reason than has a dog; nay, not so much, for he knew not friends from foes. Untold, untellable suffering and misery surround us on every side; but civilised beings understand their woes, can explain them, and, if the chance come, rise out of them. But this poor negro, forced from his home, from all with whom he could communicate, thrust at one fell instant from his barbarous quietude beside some African river into our enlightened, civilised, horrible world, was as utterly lost and dumfoundered as though he had died by violence, and his soul had risen in another state of being. There is a tale of some chivalrous young Frenchman who so heated his indignant blood with the perusal of Spanish cruelties, that then and there he sallied out to avenge the crime of past generations on the offspring of the evil-doers. Such a wild impulse stirs in me sometimes as I think of poor Joe's wrongs.

However, it is not my hero's history I have to tell, but his character and tone of thought I would describe. We were sitting on the trunk of a cotton-tree, as aforesaid. 'Are you married, Joe?' I asked, between two bites of a 'tortilla.'

(Already I have announced my incapacity to render the negro's patois; I don't attempt it.) 'No, sir,' he answered. 'None of the "muchachas" will have me.'

'Why not?' I asked. 'You're tall and stout. There isn't a man on the country-side who can hunt like you; and the business is profitable.'

'Well, sir,' he said, 'I don't understand 'em. I'm nothing but a poor "nigger,"* and I don't know creole ways. There's a girl I was sidling up to, shop-maid at a store yonder, not more 'n half black. We was friendly, and I give her peltries and 'pine quills' [porcupine quills], 'and she took 'em kindly. But says she to me one day: "What d'ye believe, Joe?" "'Most anything," I says, not knowing what she meant, you see. "D'ye believe in works?" she says. "Most sartin," I replies. "Or d'ye believe in election?" "That's what I believe," says I. "Not both?" she says. "No, not both!" says I. "Which, then?" says she. "Why, the other!" I says. So she called me bad names, in a way not fitting for a young girl speaking to a man. I held my tongue; and we parted.'

*'Nigger,' among negroes, is a term of reproach applied to blacks of African birth, as opposed to those born in America or the islands. The latter call themselves 'creoles,' with the added name of their birthplace; Jamaica creoles, St Thomas, &c.

'But you 've tried again in another quarter?'

'Yes. I made out it was something they talk about in meeting-house that had set her off; this was in Greytown, of course. So I used to attend regular at the service there, and the minister was kind; like the folks at Sarah Leh'n he was.'

'Did you understand what he said?' I asked.

'No, sir. I 'm a poor nigger, and it was beyond me. He said we were to be good, which isn't Obi. I don't know what he meant by that. I asked Obi, and he told me the minister was right, whatever he said. So, after a while, I took up with a muchacha as lives behind the cocoa-nut trees on the lagoon. I said to her: "My trust is in election." "What 's that?" she asks. "Election," I says. "What 's that?" says she. And I didn't know any more. "You 're a heretic!" she says a day or two afterwards. I didn't see what to answer, and so we dropped that acquaintance.'

These recollections seemed to affect poor Joe painfully. He sat leaning on his rifle, and grinding at the dank earth with its but, observing with great interest the circles thus formed.

'Well, and what next?' I asked.

'I lost heart for a long time, and hid myself all day and all night in the woods. I never made a better time of it than that. Pigs and deer were more plentiful than ever I found them, and I even met a jaguar—which isn't common, you know, by Greytown. At last I put down the river, with nigh upon a hundred dollars' worth of hides, and seven full quills of gold-dust that I 'd found in a creek. I met a young girl as fine as a quetzal bird, a stranger in Greytown—she was a washerwoman. After a week or so, I asked her to marry me, saying I was no heretic. "All right," says she. Somehow, I didn't like that. Says I: "About election?" I says. "Never you mind," says she. "And works?" I says. "You 've no call to trouble about that," says she sharp. I thought she was no better than I was myself, and left her. I've not tried since. It seems as if there isn't no one in all this country as is suitable for a poor nigger!'

There were several points which struck me much in this little conversation, which I have not attempted to give textually, though preserving the *tone* as nearly as possible. First, it interested me to observe how entirely this savage possessed the instinctive sympathy—using the word in its strict sense—that distinguishes the creole negro. Though quite unconscious what was meant by the words of his first two loves, he had comprehended, by mere sympathy, that great importance attached to his answers, and that to ask what was meant by 'election,' 'heretic,' and so on, would be destructive to his chance. This quality of reading a person's mind when his words are utterly beyond understanding, is common with negroes, and, I think, is the secret of that liking which most tropical residents bear to them in the abstract. It is the same gift which an intelligent dog possesses in a less degree.

Another and more novel subject of reflection was the free use Joe made of Obi's name, that dire dissyllable which none willingly pronounce in the West Indies. When a blundering stranger, chokeful of questions and bits of half-knowledge, asks his host about Obi and his worshippers, there is loud laughter in the household—maybe laughter a little too loud. 'Obi, my dear sir!' repeats the host. 'There is no such thing among us, and never was—never. You have your bugbear for children in England, and we have our Obi here—the same idea under a different name. It 's enough to make one die of laughter to hear you English people take our Obi seriously. I might as well ask you "the truth" about the giant Cormoran, or the black man who frightens your children to bed.' So have respectable gentlemen expressed themselves to me who write. But long before Joe thus openly made allusions to the dread superstition, I knew how much to believe of the creole planter's eager denial.

Let Joe speak for himself and for his horrid faith. 'Do you say, Joe,' I asked, 'that the dreadful monster you call Obi commanded you to obey the Christian minister?'

'He always does so, sir,' Joe answered. 'Never Obi tell a man to go against the minister.'

'But you yourself said that Obi wasn't "good."'

Joe had no reply to this. He looked at me, and ground the but of his rifle into the soil. At length he repeated: 'Never Obi tell a man to go against the minister.'

On this I reflected for an instant. Joe's words explained in some degree a mystery that has perplexed very many persons who know the existence of Obi-ism, but cannot understand how a race so simply pious as is the negro—I speak of the *race*, mind—can reconcile the practice of a devilish superstition with the enthusiastic belief of evangelical Christianity. But Obi is equal to this difficulty. 'Never he tells a man to go against the minister.' But where the minister has not spoken, on doctrines and deeds the good man would shudder to contemplate, there Obi is master.

'You speak of consulting him. Does he live in the woods round here, and do you see him in the flesh?' I asked.

'I haven't seen Obi in the flesh these ten years: not since I landed at Greytown. Once I see him upon the Blue Mountains behind Kingston. There isn't an Obi in this part of America that I *know* of, sir.'

'Not an Obi? Are there several, then?' And on this I drew from Joe an explanation of the idolatry, most valuable and curious, I think, to those who feel an interest in the negro race. I would fain put into some order the facts he confusedly revealed.

'Obi' is not the name of a deity, as is the common belief. Comparative philologists connect the word with *ophis*, a snake, and deduce from this fact the most singular arguments. I cannot say how far the derivation may be correct; but if, as Joe declared to me, the Obi is *not* a deity, nor even an emanation, it is evident that much of the theory founded on this basis is incorrect. Obi, I learned, is but the title of a man—a man gifted with strange and magical powers, it is true, but simply a man. One is born Obi; no person can acquire the attributes or the title. The child so favoured is recognised almost at birth by his supernatural potency over men's minds. By whom he is swayed, or for what purpose the power is given him, no one investigates, or dares to inquire. The Obi is—the Obi! a terrible fact, a curse, seldom or never a blessing to his neighbours. It is a most important truth to be known, that Obi, all-powerful for evil, seems impotent for good—and by his own confession, he can kill, but he cannot generate life—he can curse, but not bless. The Obi is a solitary

being, a lover of caverns and deep forests, a feeder on strange meats, a hater of the light. From his seclusion he casts the darts of death, and never do they fail to strike. He dreads his own horrible faculty, and rolls upon the floor in speechless terror when summoned to do the work that men crave of him. But, whether unconscious agent or irresponsible, or no, Obi never fails. Pestilence is a weapon in his hand; dreams and apparitions are obedient to his will; all the baleful secrets of nature reveal themselves to his intuition—the deadly uses of herb and tree, and of animate and inanimate life.

I have but room for a very few of Joe's candid revelations. I choose those which may possibly explain in some degree the manner of Obi's working.

'How did you consult this fearful being, since he is as far away as the Blue Mountains?' I asked.

'Obi gave me a charm, which I wrap round my head at night, when I wish to see him. He never fails to appear in my dreams, and to tell me all I want to know.'

'Has he given you any other charms?'

'One—a hunting charm. I never miss when I have it on me, and never hit when without it.'

'Is it true that Obi delights in poisonings and frenzies?'

'I don't know. They say that if a man ask him for a poison or a philtre, he cannot refuse. I know nothing of that.'

'Most of the Obis are women, are they not?'

'No,' exclaimed the negro with contempt. 'Obi has more work than he can do, and therefore gives power, for a short time, to the fetich women. But when the time is past, they are no stronger than other people, only they know the poisons and medicines. Then they go about doing mischief, until they're caught and hanged by the magistrates, or thrown into a creek at night by the negroes. Obi's never caught, nor dare any one touch him.'

'Are there many Obis?'

'Only two in all Jamaica, and one of 'em's only a poor nigger, they say. But there's a plenty of your fetich women!'

So this savage discoursed to me sitting on a cotton-tree in the forest by the San Juan River. And the conclusion that rested on my mind, in regard to Obi, was this: if there be truth in mesmerism and electro-biology, there is the secret of his dreaded power; if there be not truth therein, then the trick of one is the trick of the other.

SPECTRUM ANALYSIS.

Within the last ten years, there has been made in physical science one of those extraordinary discoveries which almost revolutionise our knowledge of nature, and constitute a new era in scientific investigation. It has been found that luminous substances write down for us, as it were, their own chemical and physical nature and constitution, with an accuracy and delicacy almost surpassing the power of belief. The prismatic colours of the rainbow have been found to contain within them volumes which all the philosophers of the world cannot hope fully to read in centuries of time. No discovery of modern date can bear comparison with this spectrum analysis, as it is called, in regard of the extent and importance of the field it has opened to science.

It has long been known that if a beam of light be made to pass through a small triangular piece of glass, called a prism, the differently coloured rays of which it is composed will be separated from each other, so that if the light is afterwards received on a white screen or wall, the colours will be found to be spread out on the wall in the same order and proportionate breadth as is seen in the colours of the rainbow. This is owing to the fact that each ray is bent or deflected from its straight course in passing through the prism, and every separate ray to a different amount; those at the red end of this spectrum being bent least, and those at the violet end most. Early in this century, the well-known philosopher, Dr Wollaston, observed that if bright sunlight were thus received on a white screen in a very dark room, being admitted by a very narrow slit, a great number of dark lines were to be seen crossing the breadth of the spectrum, as many as fifteen thousand having since been counted. A German optician, Fraunhofer, subsequently described these lines more accurately, and found that they occupied invariably the same relative position in the length of the spectrum, so that he was able to mass and number them with great accuracy. Some of them were broad and distinct, and the most important of these were designated by various letters of the alphabet; others were very narrow and fine; some were single, others formed groups; but all were invariably the same in every particular, and in their relation to each other in position. It was further found that light from a white-hot solid body gave no dark lines at all, but presented a continuous spectrum, in which the colours were shaded into each other through every possible gradation. It had also been found that the vapours of various substances exercised an absorbing effect on the solar rays, the dark spaces caused by them being lines quite similar in character to the dark spaces in the solar spectrum, though the system of lines was different from that of the solar spectrum, every different substance producing, when vaporised, its own peculiar system of lines.

Another step was gained in another direction, and apparently without much bearing on this question of the significance of these dark lines. It was found by the German philosophers Kirchhoff and Bunsen that artificial light, produced by combustion—that is, by chemical combination—also gave a peculiar spectrum, and that of a most remarkable kind, shewing neither dark lines, like solar light and starlight, nor yet a continuous spectrum, like bodies in a state of incandescence without combustion, but a spectrum composed of a few bright lines, occupying definite positions in the spectrum field, or space where the solar spectrum would ordinarily be seen, and having colours accurately corresponding to the precise portion of the continuous spectrum which would be seen at the spot where they made their appearance. It had been well known, long before, that certain substances in burning tinged the flame with peculiar colours; but what the precise shades of colour were could not be told by the unaided eye, on account of the mixing together of various colours and shades.

Thus, it was well known that salts of sodium communicated a yellow colour to any flame in which they might be present; this being, indeed, the cause of the yellowness in the flame of all

our ordinary artificial lights. Salts of copper and of barium give a green tinge to flames in which they are present, and those of strontium give a crimson hue. This was well known; but it was not until the light from these and similar flames was analysed by the prism, that it was found that these colours, which could not be accurately distinguished by the eye, were nevertheless wholly distinct, being the result of the blending in the light of sets or systems of bright bands occurring in totally different portions of the spectrum field, and being composed, in fact, of rays differing in refrangibility and hue, but absolutely fixed and invariable for each separate source of artificial light. Thus, when sodium or its salts were submitted to this prismatic analysis, it was found that the spectrum produced consisted of a very strong bright line in the yellow portion of the field, and of this line only, this sodium spectrum being the simplest of all known spectra, though it is found on close examination with powerful instruments that the bright line is double, consisting of two very close together. The instruments used are in general two telescopes and the prism, which is placed between them, the light being condensed on the prism by one telescope, and the spectrum magnified after refraction by the other. A microscope, with the usual reflecting mirror, may also be used, being fitted with a micro-spectroscope containing the prism. If a powder, containing some easily volatilised metals, such as sodium, lithium, and thallium mixed together, is placed on a slip of platinum, and introduced into the flame of an ordinary Bunsen's burner, the light being then made to pass through a microscope thus fitted, the observer will see one bright line after another crossing the field of view, as one after another of the metals becomes sufficiently heated to pass into the gaseous condition. The spectrum of the alkaline metal lithium consists of two lines—a brilliant one in the red portion of the spectrum, and a weak one in the yellow. Both are sharply defined, and by this test the metal has been found to be present in the ash of muscular tissue and of blood. The red colour observed in strontium flames is similarly found to be due to the presence of six strongly marked red lines in its spectrum, which contains also, however, an orange and a blue line. The red line mentioned as belonging to lithium very nearly corresponds with one of these, but is distinguishable by its superior brilliancy.

Yet there seems to be some strange and mysterious connection between these two metals, some problem still unsolved in their relation to each other; for on one occasion, when Dr Tyndall was exhibiting at the Royal Institution the spectrum of lithium by means of the very high heat of the electric spark, a line not observed in the spectrum of this metal at the lower temperature of a gas-flame unexpectedly appeared, and this line was of a brilliant blue, like the blue line of strontium. This experiment was again and again repeated by different observers, and always with the same results. Professors Roscoe and Clifton at last compared the two spectra by placing one above the other in the spectroscope, and found, to their astonishment, that the blue lines accurately corresponded with each other; and not only so, but they found in both spectra two other faint blue lines, which had previously been unnoticed, and these lines also accurately coincided in the two spectra. We can hardly avoid the conclusion, that at the high heat produced by the electric spark, these two metals are decomposed into some simpler elements, one of which is common to each, and gives these coinciding blue lines.

The green tinge of barium flames is found to be due to several bright green lines in the barium spectrum; while the spectrum of calcium shews, amongst others, a single strong green and a single strong orange line. The spectrum of potassium has a continuous character, containing, however, two strongly marked lines—one in the red, and the other in the violet, the flame being tinged with a purple colour.

Four new metals have been added to our list by means of this method of chemical analysis, of which two are metals of the alkalies, thus making the number of known alkaline metals five. The two new members of the group are named rubidium and cæsium, so called from the peculiar characters of their spectra, rubidium having some red lines not seen in the potassium spectrum, and cæsium shewing two magnificent blue lines very close together. These metals are more strongly electro-positive even than potassium, but so closely resemble it in chemical properties that they had always hitherto been mistaken for it: they are found in many mineral waters, and in the ashes of several plants. The third new metal is thallium, found by Mr Crookes in the deposit in the flue of a pyrites burner, and named from its splendid single green line, and having chemical properties intermediate between lead and the alkalies. The fourth metal is indium, belonging to the chemical group which contains iron, and recognised in the spectrum analysis by its fine line in the violet.

If the permanent gases are highly heated, as by the passage through them of the electric spark, they also give spectra peculiar to each; thus, that of hydrogen has three lines—one bright red, one green, and one blue.

The accuracy with which the presence of a given substance may be predicated by this mode of analysis is greater than that afforded by any other chemical tests, as will be perceived on considering that some substances, such as iron, have a most complicated spectrum—as many as sixty lines or upwards, the presence of any one of which would, in most cases, be a satisfactory proof of the presence of the metal or other body; while that any two substances, distinguishable by other tests, should present identical spectra, seems, in the nature of probabilities, unlikely almost beyond the power of arithmetical expression, and, as regards observed fact, contrary to all analogy. Yet, the accuracy of this method of analysis is almost equalled by its delicacy: in the case of sodium, the presence of a quantity less than the $\frac{1}{1000000000}$th of a grain can be demonstrated by this method; it is hereby found that the presence of sodium is so universal throughout the world as to be capable of recognition in every artificial flame, and a piece of wire shewn to be perfectly free from sodium is found to become covered with it by simply drawing it through the fingers; indeed, the mere exposure of any substance to the air for a moment causes it to give the sodium line in the spectrum.

While Messrs Kirchhoff and Bunsen were pursuing these researches on the luminous spectrum lines of different heated gases and vapours, and on

the absorbent effect of gases on rays of light coming from a more highly luminous source, it occurred to them to compare with each other the two forms of spectra thus produced—namely, the bright spectrum, containing dark absorption lines, produced by the passage of the light through some gas or vapour; and the dark spectrum-field, illuminated only by a few bright lines, produced by the same gas or vapour when brought to a highly heated and luminous condition. The bright and dark lines thus produced by the same element were found accurately to correspond. The great discovery of the nineteenth century burst upon them in its full splendour, fraught with results hardly to be imagined. The gases and vapours intercepted precisely the same rays, from a source of continuously coloured light, as they themselves emitted when brought by heat to the luminous condition; and, of course, the different elementary bodies revealed their presence alike by their own bright bands, and by their corresponding dark lines produced in a continuous spectrum. The inference was immediate and irresistible, that the dark lines in the solar spectrum were due to the presence of certain gaseous elements in the solar atmosphere, which absorbed portions of the continuously coloured or pure white light emitted by the solid bodies known as Nasmyth's willow-leaves. By comparing these dark lines with the bright bands of the elements when brought to a gaseous condition, it was now possible to determine what elementary bodies were present in a state of gas in the solar atmosphere. This is easily done by superposing the solar spectrum with its dark lines over the bright-line spectrum produced by one element after another; and the elements iron, magnesium, calcium, sodium, chromium, nickel, barium, copper, zinc, and hydrogen are thus found to be present in the solar atmosphere. That man should thus be able to analyse the atmosphere of the sun, placed at a distance of ninety-one millions of miles from us, with as much ease and certainty as he could analyse a measure of gas placed in his own laboratory, must surely be accounted one of the most wonderful results of science in any age.

Of course, it immediately became a matter of great interest to ascertain whether similar results could be obtained in the case of the fixed stars, and whether it would be possible to predicate the existence, in these distant suns, of the chemical elements familiar to us on our own globe. With powerful instruments, this was found to be quite possible. The spectra of the stars are found to be very different from each other and from that of the sun; but they reveal the presence of many elements well known to us as existing on our earth. Thus, the brilliant red star Aldebaran, in the constellation Taurus, has been found to contain hydrogen, antimony, bismuth, mercury, and some other elements similar to those of the sun. In Sirius, the most brilliant star in the heavens, only sodium, magnesium, and hydrogen can be certainly affirmed to exist. Two strongly marked violet lines in Sirius belong to some substance not known on our earth. Antimony, though found in Aldebaran, is a metal whose bright lines are wholly unrepresented by corresponding dark lines in the solar spectrum; and gold, lithium, &c. are in the same category. The star Betelgeux, which is the brightest of the two above Orion's belt, has a very deeply lined spectrum; sodium, magnesium, iron, copper, and several other metals are known to exist in it, but no hydrogen has been discovered. This is a yellow star. We may class stars as white, yellow, and deep-coloured. Sirius, Vega, Castor, and the greater number of minor stars, belong to the white class. The presence of hydrogen appears to be a marked characteristic of their spectra. The Sun and Arcturus belong to the yellow class. Betelgeux, Rigel, Mira, Albireo, Antares, Aldebaran, and many others belong to the third class, some of which are red, and others blue. α Hercules and β Pegasi, both of which belong to this class, have very remarkable spectra, shewing the appearance of a multitude of bright flutings separated by wide black bands: this must indicate that their atmospheres are charged with a great multitude of vapours belonging to many different substances. The colours of the stars depend, of course, on the character of the vapours in their atmospheres: if the atmosphere of a star absorbs a great deal of the violet end of the spectrum, and therefore shews many black lines towards that end, the star will have a red colour; if there are many black lines towards the red end, the star will have a blue colour; if the absorption is pretty evenly spread throughout the spectrum, the star will be white; yellow will result from a good deal of absorption at both ends, the middle being less affected. Stars of the same type are generally found a good deal grouped together. Orion abounds in stars of a green colour; white stars are found about the Pleiades and the Bear; yellow stars about the Whale.

Some stars give bright lines instead of dark ones, but these are very rare—β Lyræ and γ Cassiopeiæ do so, and some small stars in the Swan. This indicates, of course, that actual combustion is going on in these stars, whereas the ordinary black lines indicate an atmosphere of vapour surrounding incandescent material. A very remarkable instance of bright lines occurred in a star that suddenly became very bright in May 1866. This was a telescopic star in the Crown, which, in the course of a couple of hours, attained the brightness of a star of the third magnitude. It was first observed by Mr Birmingham at Tuam, in Ireland; a celebrated astronomer, Dr Schmidt of Athens, had been observing the same spot in the heavens about three hours before Mr Birmingham, and had observed nothing remarkable. Astronomical *savans* immediately turned their attention to the star, which, however, only continued bright for two or three days, and then faded away to its original size. In the meantime, however, Mr Huggins had turned his powerful spectroscope upon it, and had found out that it was nothing less than a world on fire, its brilliancy being due to the combustion of hydrogen with some unknown element. This was exhibited in the spectroscope by the presence of the bright lines of hydrogen along with some other bright lines, which have not been produced by any element on our earth. Several instances are on record of unknown stars suddenly blazing out in this way, and then soon fading away again.

It naturally followed that, after the stars, the nebulæ should be submitted to spectroscopic examination. These, as is well known, are faint fleecy cloud-like masses, most of them extremely minute, which stud the heavens in great numbers. Most of them are quite telescopic, but some are easily recognisable by the naked eye, such as the great

nebula in the sword of Orion, lying between the two stars which, along with it, seem to hang down from the belt; the great nebula in Andromeda; and the nebula in Hercules, which is, however, much more difficult than either of the former to detect with the naked eye, although we ourselves have constantly made it out on clear nights. Though some are thus visible to the naked eye, nothing can be said to have been known of the nebulæ till after the invention of the telescope. This instrument has revealed hundreds of these beautiful objects, and exhibited their extraordinary structure. We have them ring-shaped, dumb-bell shaped, crab-shaped, and of all irregular forms. Under the high power and vast light-gathering capacity of Sir W. Herschel's four-foot reflector, many of them were found to consist of a vast congeries of stars, and hence have been considered to be star systems like the Milky-way, the star system to which our sun belongs. The distance of these systems has been supposed to be such that thousands of years must be spent ere their light travels to us. When examined by the spectroscope, they are found to have continuous spectra, doubtless because the dark lines produced by one star composing them will be illuminated by the light of another star in which the elements are absent to which the dark lines of the former were owing. The great nebula in Andromeda, spoken of above, is an instance of this kind of nebula. But some of these mysterious objects proved intractable to the highest powers Sir W. Herschel could apply; the great nebula in the sword of Orion was of this sort; it is seen as a misty cloud surrounding several bright star-like points known as 'the trapezium.' Lord Rosse tried it with his great reflector, and thought that some portions of it shewed signs of approaching resolution into stars—that is, looked as if a better instrument would shew that it was composed of stars. In his telescope it formed a most beautiful object, branching out in streamers in all directions, and extending much farther into space than had formerly been supposed. But Mr Huggins turned his spectroscope upon it, and found that instead of being composed of stars, it consists of gaseous matter; in fact, that it is a true nebula, and not a star system. The spectrum was not continuous, like that of the nebula in Andromeda, nor did it exhibit dark lines, like the stars, but three bright lines only; shewing that it was composed of gases in a state of incandescence. One of these bright lines belongs to nitrogen, another to hydrogen, and the third to some unknown substance; two of them are in the green, and one, that of the hydrogen, known as F, in the blue. The same result has been presented by most of the other true nebulæ, so that it cannot be any longer doubted that the sagacious conjecture of Sir W. Herschel was right, that these are systems in process of condensation from a gaseous into a liquid, and subsequently, doubtless, a solid condition—a change which Laplace conjectured, and no doubt with reason, to have taken place long ages back, in the case of our sun and solar system.

Mr Huggins has recently arrived at another result of extreme interest in connection with his spectroscopic observations of the stars, and this is, that by the aid of this instrument we can estimate the motion of the stars towards or from the earth, and the rate of such motion. We shall endeavour to explain the principle on which this astonishing discovery is based. It has long since been satisfactorily proved that light is, like sound, due to an extremely rapid succession of minute waves, which, occurring in the luminiferous ether, strike the eye, and become appreciated by it as light. It is also well known that, as in the case of sound, an increase in the rapidity with which the waves of air strike the ear is attended by a sharpening of the note sounded, while a decrease of this rapidity is attended by a flattening of the note; so in the case of light, the more rapid the vibrations of the luminiferous ether, the more the colour approaches to that seen at the violet end of the spectrum; and the slower the vibrations, the more it approaches to that seen at the red end. Now, it was suggested by Doppler, and proved by Ballot, that in accordance with this fact, changes could be artificially produced in the pitch of the same note as appreciated by the ear, that the ear could be made to hear the same note artificially sharpened or flattened. The mode Ballot adopted of experimentally proving this interesting point was as follows: he placed musicians upon rapidly moving trains, and desired them to sound continuously the same note, while they passed by other musicians stationed beside the line, to listen to this note. He thus employed the most delicate test known for the estimation of the varying or unvarying rate of rapidity of the waves of sound—namely, the trained musical ear. The result obtained was in perfect accordance with the theory—namely, that while the trains were advancing, the note sounded was heard sharpened, or, as it is called, higher than it sounded to the ear of the musician who produced it; while the self-same note, as the train receded, was heard flattened, or lower than it really was; the waves of sound being evidently shortened in the first case, and lengthened in the last, in the same proportion, compared with their natural or normal length, as the speed of the train bore to the rate at which sound travels. Obviously, the same result must hold in the case of light; but light travels with such enormous speed, that no artificial change could affect it in any appreciable degree. The rates of motion of the heavenly bodies might, however, bear some appreciable proportion to the speed of light, and this was the question which Mr Huggins proceeded experimentally to try; and the result was successful; but it put the highest powers of his finest instruments to the very utmost test. The apparatus he used produced a dispersion of light—that is, a lengthening, or rather widening out of the spectrum, equal to that produced by seven prisms of 60 degrees of dense flint glass. Now, it is clear that the eye would be wholly unable to appreciate any difference in the shade of colour produced in bright lines, as from nebulæ, in consequence of their being moved slightly towards one or other end of the spectrum, as a result of changes in the rapidity of the light-producing vibrations; but the position of the dark absorption lines from a star being accurately measured with fine micrometers, might perhaps exhibit a slight deviation towards one or the other end of the spectrum, according as the luminous body might be moving from us or towards us. And this was found to be the case, to the extent of about the two-hundred-and-fiftieth part of an inch. Of course, if the experiment were tried with only a single line, any alteration, however slight, might imply only a new substance in the star's

atmosphere; but when the same change is found to affect every line proceeding from a star, and always in the same direction, and in the same proportion, the inference is irresistible that the change is due to the motion of the luminous body. The light of Sirius, when thus tested, was found to be slightly degraded—that is, its refrangibility was lowered; or, in other words, all the dark lines were shifted towards the red end of the spectrum; shewing that the vibrations come to us somewhat lengthened, or made slower, than they ought to be; and thus establishing the fact that the star is moving away from us. The result arrived at by measurement of the amount of this degradation of the light is, that Sirius and the Earth are becoming removed from each other at the rate of forty-one miles in a second of time, of which twelve miles per second was due, at the time of observation, to the Earth's motion in the same direction as the rays of light, leaving twenty-nine miles a second as the actual rate of recession of the star from us. Many other interesting facts have been arrived at by the application of this wonderful instrument of research; but the above may suffice to explain the nature of these investigations, and illustrate the results arrived at.

ABOARD THE SEA-MEW.

IN TWENTY-TWO CHAPTERS.—CHAPTER VIII.

It was a rush, and no mistake; for they had been priming themselves up with rum, I should think, for the last hour or two, till they were nearly mad; and with Van at their head, they came on, yelling like so many devils, more than Englishmen, though certainly half of them were from all parts of the world. There was no time then for thinking, and before you knew where you were it was give and take.

We fired as they came on; but I did not see that much harm was done, only one chap falling; while, as they returned it, Mr Wallace gave a cry, and clapped his hand to his shoulder, dropping at the same time his cutlash, which Tomtit laid hold of, for he had just shied his pistol, after firing it, right at Van's head, only missing him by half an inch or so.

Van dashed right at the skipper like a cat, and with one cut sent him down, when he turned upon me, to serve me the same; but I was too quick for him, and as I jumped aside, his cutlash hit the bulkhead and snapped in two. I believe it would have gone hard with him then, for that carver was sharp, and my old blood was up, but in the struggle I was driven back; and the next thing I saw was Mr Ward drive that skewer of his right through one fellow's shoulder, and then starting back, he fired three shots from his revolver, but with what effect I never saw, for two of the piratical rascals were at me, and it was all I could do to keep them at a distance. I fetched one a chop across the back of the hand at last, though, and sent him off howling and cursing; and then managing to avoid a cut, and sending my arm out, I caught the other right in the chest, and down he went like a stone; when, to my surprise, I found it was only the buckhorn handle I had hit him with, the blade having flown out, and gone goodness knows where.

There was no time to choose who should be your next enemy, for two or three were at you directly, and there I was at last, fighting best way I could with my fists, driven here and there with the planks slippery with blood, and men, some wounded, some only stunned, lying about for you to fall over.

I kept casting an eye at Mr Ward, and could see that he was fighting like a hero; but all at once I made a jump to get at him, for I saw Van creep up behind, while he was defending himself from a big fellow with a cutlash, and though I shouted to him, it was of no use, for the poor young fellow was cut down just as I turned dizzy from being fetched down with a crack from a marline-spike.

CHAPTER IX.

When I came to again, my head was aching awfully, and I found myself lying upon the deck, with old Sam Brown dabbing my forehead with a wet swab. Close aside me was Bill Smith, and the sight of him alive did me so much good that I jumped up into a sitting position, and gave his hand a good shake. But, there, it was for all the world like having boiling lead poured from one side to the other of your head, and I was glad to lean against the bulkhead again.

There were half-a-dozen of the crew keeping watch over us, while Sam whispered to me that six bodies had been shoved out of the port—three being passengers; as to the rest on our side, Mr Ward's seemed the worst wound, but he, poor fellow, was sitting up pale and anxious, with his handkerchief tied round his head, and evidently, like me, wondering what was to happen next.

I could not help noticing soon after how well the women bore it all; hushing and chattering to the children to keep them quiet, and doing all they could to keep them from noticing our wild and wounded faces. They were all huddled together in the big cabin, while, with the exception of the men on guard, the mutineers were on deck. From the slight rolling of the ship, it seemed that they had altered her course; but my head was too much worried and confused for me to notice much, and that day slipped by, and the night came—such a night as, I pray God, I may never again pass; for the cabin-hatches were closed upon us, and none of the men staid down, but after serving round some biscuit and water, and some rank bad butter at the bottom of one of the little tubs, they went on deck, though we soon found that a couple of them kept watch.

It was a sad night and a bitter, for as soon as darkness came down upon us, the poor women, who had held up so well all day, broke down, and you could hear the smothered sobbing and wailing, till it went through you like a knife. I believe they tried all they could to keep it in, poor things; but then 'taint in 'em, you know, to keep up long; and then when the children broke out too, and wanted all sorts of things that they couldn't have, why, it was awful. We had no lights, for they wouldn't give us any, so we all had to set to, to try and make the best of everything; but we couldn't, you see, not even second best, try how we would.

'Only a bit of a cut, sir,' I says to Mr Ward, who was going round and doing what he could in the dark for we chaps as had got knocked about. 'I shan't hurt. See to Bill Smith here. Tell you what it is though, sir—you won't ketch me at sea again in such a Noah's Ark as this here.'

'Hush! my man,' he says, 'and try all you can

to help.' 'In course I will, sir,' I says; and then, hearing a growl on my right, I says: 'That ain't Bill, sir, that 's Sam. He 's all right: nobody can't hurt him, his blessed head 's too thick.' Directly after the doctor felt his way to Bill Smith, and tied up his head a bit, while I was wondering what to do for the best, listening all the time to women wailing, and little ones letting go, as if with the full belief that they 'd got the whole of the trouble in the ship on their precious little heads. What seemed the best thing to do was to quiet some of them; and if it had been daylight, a sight or two of my phiz would have frightened 'em into peace; but how to do it now, I didn't know. 'Howsoever, here goes for a try,' I says; and I groped my way along as well as I could, expecting every moment to be deafened, when I turned half-mad with rage, for some one yells down the skylight: 'Stop that noise!' and at the same moment there was a pistol fired right into the wailing crowd; then there was a sharp clear shriek, and directly after a stillness that was awful.

'It was a cruel cowardly act,' I heard some one say then close to me; 'but, Miss Bell'—— And then directly came the young lady's voice saying: 'It is almost as cowardly, sir, to speak to me in this way, when I am so unprotected.'

'By your leave,' I says gruffly, and I felt a little hand laid on my arm.

'Is that you, Mr Roberts?' says Miss Bell, and I could feel her soft breath on my cheek.

'It 's old Tom Roberts, without the Mister, ma'am,' I says, 'and at your sarvice. What shall I do?'

What could I do? Rum question, wasn't it? When, if she didn't put a little toddling thing into my arms—a bit of a two-year-older, as was just beginning to cry again, after the fright of the pistol; but I turned myself into a sort of cradle, got rocking about, and if the soft round little thing didn't go off fast asleep, and breathe as reg'lar as so much clock-work!

'Well done you, Tom Roberts,' I says, after listening to it for about half an hour; and do you know, I did feel a bit proud of what I 'd done, being the first time, you see, that I 'd ever tried to do such a thing; and so through the night I sat there with my back to the bulkhead, and with my head all worried like, for now it was me groaning, and now it seemed that I was crying like a child, and then people were telling me to be quiet, only I wouldn't, for I had mutinied, and was going to kill Mr Ward, and marry Miss Bell, and things were all mixed together, and strange and misty, and then thicker still, and at last all was blank, and I must have gone off to sleep, in spite of my trouble, for when I opened my eyes, it was broad daylight again, and then the first thing they lit on was a little chubby, curly-headed thing in my lap, watching me as serious as could be, and twisting its little hand in mine.

I hadn't eyes for anything else for a little while, but as soon as I did take a look round, all the troubles seemed to come back with a jump, for most of the party were asleep: there they all were, first-class passengers and steerage passengers, all huddled together, no distinctions now. Old Sam was snoring away close alongside of the skipper and Mr Wallace, and strange and bad they looked, poor fellows; while up at the far end sat Miss Bell, bending over her brother, who lay on a locker; but whether she was asleep or not, I couldn't tell.

But there was something else took my attention, and that was, that though all the other berths seemed empty, one had some one lying in it, and that berth I could not keep my eyes off, for it got to be somehow mixed up with the firing of that pistol down the skylight and the sharp cry I had heard; and so from thinking about it all, I got it put together in a shape which Mr Ward afterwards told me was quite right, for a little lad of nine years old was killed by that cowardly bullet, and it was him as I saw lying in the berth.

By degrees, first one and then another of our miserable party roused up with a sigh, and then sat staring about in a most hopeless way; all but Mr Ward, who went round to those who had been wounded, saying a cheering word or two, as well as seeing to their bandages; but it was quite by force that he had to do the skipper's, for his wound had made him light-headed, and he took it into his poor cloudy brain that Mr Ward was Van, and wanted to make an end of him.

People soon got whispering together and wondering what was to be done next, for they seemed to be busy on deck, and of course we were all very anxious to know; but when Sam Brown got a tub on one of the tables, and then hauled himself up, to have a look through the skylight, he came down again rubbing his knuckles and swearing, for one of the watch had given him a tap with a marline-spike; and after that, of course no one tried to make out.

I, for one, expected that they would have taken advantage of having their own way to have a reg'lar turn at the spirits; but no: they certainly got some up, but Van seemed to be driving them all with a tightish hand, so that they were going on very quietly and reg'larly, as we found, for by-and-by they serves out biscuit and butter and fresh water again; and not very long after, Van sung out down the hatchway for me to come up; and knowing that if I didn't go he 'd send and fetch me, I went up, and sat down on the deck, where he pointed with a pistol. Then he ordered up Sam and Bill, and four sailors who were on our side (lads only), and the skipper and Mr Wallace, one at a time, till we were all set in a row, with them guarding us; when, with his teeth glistening, Van walks up to the skipper, and hits him on the head with the but-end of his pistol, so that the poor fellow fell back on the deck.

'Set him up again,' says Van savagely; and a couple of the mutineers did so, but only for Van to knock him down once more; and he did that four times over, till, when they set the poor captain up again the last time, he fell back upon the deck of himself, being stunned like. It was enough to make any fellow burst with rage; but what can you do when there 's half a score standing over you with loaded pistols? and, besides, trouble makes people very selfish, while we all knew how Van was having his bit of revenge, cowardly as it was, for the way the captain had treated him.

Last of all, Van goes and puts his foot on the skipper's neck, and I made as though to get up, for I thought he was going to blow his brains out; and bad and cowardly as the captain had been, I couldn't a-bear to see him hit when he was down without trying to help him; but it was of no use, for I was pulled back directly, and all I could do was to sit and look on.

All at once, Van turns a breaker on its end,

jumps on it, and, sticking his arms a-kimbo like a fishwoman, he begins to spout at us; and fine and fierce no doubt he thought he looked in his red nightcap, and belt stuck full of pistols. 'Now, my lads,' he says, 'we're going to have some of the good old times over again: take possession of one of the beautiful isles in the P'cific, and sail where we like under the black flag, free as the day, with none of your cursed tyrants to make men sweat blood and work like dogs, but all free and equal. We've done the work, and captured the ship, and you've acted like thieves and curs, and sided with them as will be ready to kick you for your pains. As for you, Wallace, curse you! you have always been a cur and a tool; but we shall want help, and you can come if you like; while, you others, we'll look over what's gone by, for you did fight like men. So, what do you say?—will you join us, or take your chance to reach land in one of the boats with the lot below?'

The young lads all looked at me, to see what I'd say, for no one took much notice of Mr Wallace. Bill Smith, too, who was much better, he looks at me; and I s'pose old Sam meant to do the same, but when I turned to him, all I could make out was the whites of his eyes, till he turned his head on one side, and I got a sight of one eye, when he turned his head t'other way, and then I see t'other.

It was very plain that they meant me to be spokesman; and seeing that was to be the case, and that, after a fashion, they left me to decide, I just turns it over in my own mind for a bit, and seeing as I should be wanted in the boats to help make the land somewhere, as they was to be loaded with a set of the helplessest beings as ever breathed—why, I says: 'T'others can do as they like; as for me, you never asked me at first; and as you've done without me so far, why, you can do without me now—till you gets to the gallows,' I added, but so as they couldn't hear me. And, though I hardly expected it from the lads, they said they'd do as I did; while, as for Bill and Sam, they always was a pair of the helplessest babies as ever breathed, and left me to think for 'em ever since we first sailed together—indeed, I don't fancy as Sam ever had any thinking machinery at all. Howsoever, they said as they'd stick by me; and Van gave a curse and a swear, and a blow or two at us; and then, after a bit of 'scussion, in which women was named two or three times, and Van and another party was quite at loggerheads for a bit, he gave his orders, big and bounceable like, and telling us to lend a hand, he made ready to lower down one of the boats.

CHAPTER X.

Two boats were lowered down, and my two mates and me and the four sailors was to man 'em. They let down Captain Harness, wounded and half-mad as he was, into one boat, and Mr Wallace the mate into the other; and then a couple of compasses, and some breakers of water, a bag or two of biscuit, and a tub of butter were lowered down. Then came the job of getting the passengers into the boats. The men were ordered up first, and, some wounded, some savage, some weak and disheartened, they were made to take their places, some of the mutineers keeping guard with cocked pistols and drawn cutlashes. I believe, though, in spite of their weapons, that a little English pluck was all that was needed to save the ship; but no attempt was made, and, trembling and frightened, the women and children were ordered up, and then the boats were loaded.

'Now, then, down with you, and shove off,' says Van Haigh, shewing his cursed white teeth, and pricking at poor Sam Brown with his cutlash, just out of malice like. And you should have seen Sam's eyes that time! He never spoke, but it's my opinion if he'd had the chance, he'd have shaken Van's precious body until the ear-rings he was so proud of had dropped out of his yellow ears. But, as I said before, Sam didn't speak; he only lays hold of the side-rope, and lowers himself into the boat, already too full; Bill Smith dropping into the other, in spite of his wound.

'Now you!' roars Van to me, for I was standing hesitating, and I don't mind saying that a cold chill ran all through me, for just then I heard the click, click of his pistol cock, and I knew he was taking aim at me. But I mastered myself, and wouldn't turn round; for it was an important time, and there was much to think about. There was poor Mr Ward, with his head bound up, held by two of the mutineers; and poor Tomtit, with his knees to his chin as he sat upon the deck; and of course they weren't going, for the boats wouldn't hold any more. And there was the fat passenger, as cried when we left home; and last of all, Miss Bell and her brother below.

It didn't take me long to make up my mind, for it seemed to me as it would never do for me and my mates to go and leave them in their trouble, for maybe they'd be sent afloat in a little boat next, and wouldn't know how to work her; so, half-expecting every moment to drop with a bullet through me, I says: 'I'm blest, my lads, if I ain't had about enough of it. While the old skipper was aboard, I did my duty by him and them as was under him; but now there's a new skipper, I don't see what call there is for me to go afloat with a set o' lubbers in a crazy boat. You, Bill Smith, and you, squinty Brown, can do as you like.—Captain Van,' I says, turning to him, 'if you'll shove that pistol away, I'll stop aboard.'

'Hooray!' shouts half-a-dozen of the fellows; and I could see Van looking me through and through with them dark eyes of his; but I don't think he got much below the skin either, and besides, he was a bit tickled by me calling him 'captain;' so he puts the pistol in his belt, and the next minute Bill and Sam was aboard again, looking half-puzzled like, while the mutineers gave a bit of a cheer, and the passengers groaned at us; and, to make matters right with them on board, I jumps on the taffrail and groans again, and calls the poor beggars swabs—God forgive me!—for shoving off in so lubberly a way, with their oars dipping anyhow, nohow, one after the other in the water, and the boats not trimmed. It was a cruel trick, but I meant it all for the best; while, what to do about old Sam, I didn't know, for he was growling and swearing to himself like some old tiger-cat, and I was afraid he'd shew his teeth and claws every moment; but he kept quiet. And as for Bill, he seemed misty and dazed, never speaking, but sitting down on the deck to lean his head against the side. Then Van seemed more at rest, for, giving his orders, the men uncocked their pistols, after making-believe to blow the fat chap's brains out, and making the perspiration run down

his face, mixed up with tears, for he began to pipe his eye terribly.

'Lower 'em below,' says Van; and the fat passenger saved 'em the trouble; while, when they were letting down Tomtit, whose hands were tied, and they were going to let go, they found his legs was already at the bottom, and then his head disappeared, but only to pop up again the next moment like a Jack-in-the-box, to see what was going to be done to the doctor.

'Ain't he a rum beggar?' I says to one of the bloodthirsty devils at my side, all to make friends, you see; and he laughed, and so did two or three more, for another of 'em made a cut at the poor chap's head with his cutlash, to make him bob down the hatchway again, which he did, though only to come up again, till, finding it wasn't safe, he kept down, and we didn't see him no more just then. The poor doctor was the next to take their attention; and, seeing how cut up the poor fellow was, I'd have given something to have gone and shaken hands with him, and told him what I felt, and at first I hardly dare look him in the face.

They lashed Mr Ward's hands behind him, and I saw his lips quiver as he kept on casting an eye at the cabin stairs. I knew well enough what he was thinking about, only I daren't look at him much, for there were plenty watching me suspiciously enough; and, let alone not wanting to be knocked on the head, I felt that to do any good for the passengers, I must throw them as had the upper hand off the scent.

I was leaning against the bulwarks, making-believe to look on, cool as could be, and screwing my old mahogany phizog into what I meant to be a grin of delight at our freedom, but I know it must have been about the sort of screw that a fellow would give when lashed to a gun for a round dozen.

Mr Ward saw me grinning, and sent such a look at me as made my face grow as long as a spoon; but that wouldn't do, and I daren't give him any signal, so I laughed it off, and, pulling out my box and opening my knife, I goes up to him, and I says in a free-and-easy way: 'Have a chaw, mate?' and made-believe to cut him one.

'You infernal traitorous scoundrel!' he shouted, and in spite of his lashings he made at me; while, making-believe to have my monkey up, I up with my knife and made a stroke at him, sending it through his pilot-coat and into one of the side-pockets, dragging at it, to get it out again, and keeping it hitched the while, till some of them laid hold of me by the arm, when, struggling and swearing, I hit out with my left hand, and caught Mr Ward upon the chest, sending him down upon the deck, when I tried again to get at him, but they held me fast.

'I'll let him know,' I spluttered out; and then Brassey, Van's right-hand man, gives the order, and three of his mates drags Mr Ward down the hatchway; when I pretended to be better, and only kept on muttering and scowling about like a dog that's lost his bone, till ten minutes after, when I got a pannikin of grog, and sat looking at what was going on.

CHAPTER XI.

I don't think I'd any plans made; my only idea was, that when they sent the three or four others off, me and my mates might seize another boat, and row after them, the same night, for they wouldn't get very far, as I knew, unless a fresh breeze sprung up, and took us away. Certainly the two boats that had gone were loaded deep, but they were not making a mile an hour; and it seemed plain enough to me that unless they could answer for its being calm till the poor wretches were picked up, if they ever were, the brutes on board had murdered 'em one and all, men, women, and children, by a slow kind of torture.

'Not very smart crews, matey,' I says, pointing with my knife over my shoulder to where the boats were slowly rising and falling, and then I fished out a piece of chicken from a tin case of the skipper's, and went on eating away as if I hadn't a care on my mind. 'Pig away, my lads,' I says to Bill and Sam; but Bill couldn't touch a snap. Sam made up for it, though; and after plenty of hard work and fighting, and two days on biscuit and water, and that rank yellow grease sailors get for butter, one's teeth do get rather sharp. 'Now, if you'll just sarve another tot o' grog round, cap'n,' I says to Van, as I wiped my knife on the leg of my trousers, 'I shall be about done and ready for work.'

Some of the fellows laughed, and Van said something about my not being such a bad sort after all; but I could see as he did not trust me, which, I must say, was quite right, and the only right thing as I ever saw in the blackguard's character.

I soon found that though they'd all doubled the Cape a good many times, there wasn't a man with navigation enough in him to tell where we were, or how to carry the ship on her course; while, though I don't believe I could have worked a reckoning right, yet, somehow or other, I fancy I could have shoved that old ship's nose into the harbour for which we were bound. Their plan seemed to be to crack on due south till we'd got high enough, and then to steer west, and get into the P'cific best way we could. I give them my bit of advice when it was asked, for I thought that the more we were in the track of ships, the more likely we were to be overhauled; but they would not have it my way; and Van giving his orders, a lot of us sprung up to make sail. When lying out on the main-royal yard, I run my eye round and quite jumped again, for, bearing down towards where the boats were crawling along, there was a bark with every stitch of canvas set.

Sam saw it too, for he grunted; but I give him a kick, and down we came, our vessel feeling the breeze now, and careening over as the water began to rattle under her bows.

I felt more comfortable after that; for though I did not for a moment think that the ship I had seen would overhaul us, still I felt pretty sure that she'd pick up those poor creatures in the boats, and save them from a horrible death. There was no doubt about having seen the bark, but from the deck never a glimpse was got of it; and we went bowling along in capital style, just, in fact, as if we had been a honest ship on a good cruise.

Having nothing particular to do, I went below, and the first place I came to was the cabin that had been fitted up for Mr Butterwell's birds; and on getting to 'em, there they were, poor little things, fluttering and chirping about with their feathers all rough, for they'd got no water and seed. Quite a score of 'em were lying dead in the bottom amongst the sand; and after giving the

pretty little things water, and seed, and paste, I fished out the dead ones in a quiet, methodical sort of way, turning over something in my mind that I couldn't get to fit, when I feels a hand on my shoulder.

'Going to wring their necks?' says Van, for it was him come down to watch me.

'Not I,' I says. 'They'll do first-rate to turn out on the island we stops at. Sing like fun.'

'Look ye here, Roberts,' he says, 'we're playing a dangerous game, and you've joined us in it. Don't play any tricks, or'—— He didn't say any more, but looked hard at me.

'Tricks!' I grumbled out; 'I'm not for playing anything. I'm for real earnest, and no favour to nobody.'

'I only said don't,' says Van; and he went up again.

'A suspicious hound,' I says to myself; and then I began to turn over in my own mind what I had been thinking of before; and then having, as I thought, hit upon a bright idea, I hugged it up, and began to rub it a little more shiny.

You see what I wanted to do was to get a word with Mr Ward, and how to do it was the question. I knew well enough that I should be watched pretty closely, and any attempt at speaking would be put an end to most likely with a bullet.

I rubbed that thought about no end, and next morning I goes to one particular cage where there was a linnet that I had seen Mr Butterwell play all sorts of tricks with; and instead of feeding it, I quietly took out the panting little thing, carried it on deck, got up in a corner under the bulwarks, and waited my time, watching the while to see if any one had an eye on me. Then I let the bird go; and it flitted here and flitted there with a tiny bit of paper fastened under its wing, till, as I had hoped, there came from out of the cabin skylight a particular sort of chirrup, when the bird settled on the glass for a moment, and then dropped through the opening where it had been broken.

Now, on that bit of paper I had printed what I knew wouldn't hurt me if the bird was seen by the mutineers, for I was afraid to say much the first time; and as I had written on it, 'Let him go again,' so sure enough up he came ten minutes after, and watching my chance, I followed him about till I caught him, and took him back to his cage, and gave him plenty of seed.

Van had taken possession of the cabin next to where his prisoners were, and the skylight being partly over his place, a word with Mr Ward was out of the question; while such a little messenger as I had found would go to his master when called, perhaps without calling, specially after him fortunate enough to catch sight of the bird the first time I tried.

All that day matters went on as usual, a strict watch being kept over the prisoners, and more than one as I fancied having an eye to me. On and on we sailed due south, and the weather kept wonderful all the time; but there seemed no sign of starting the rest of the passengers off in a boat, and I began to feel worried and troubled about their fate, and more anxious to get on with the plans I was contriving.

CHAPTER XII.

Now, not being a scholar, I had a deal of trouble over the note I got ready for the next morning, for, you see, I wanted to say very much in a very little room, and in a way that shouldn't betray me if it was to fall into the wrong hands. It was meant for Mr Ward, but I knew Tomtit would get it; but that didn't matter, as they were fellow-prisoners, and what I wanted was to put the doctor on his guard, and also to let him know that all I'd done was so as to be alongside of him and Miss Bell. So I says in the note:

'Honoured Sir—Lay yourself well to the wind, and haul every sheet taut. Them as you thought was sharks a shewing their teeth warn't only shams. Take all you gets, and clap 'em under hatches, and, whatever you do, don't be deceived by false colours, nor hail ships as seems enemies.'

'There,' I says to myself, when I'd got that printed out careful, 'if he can't make that out, he can't understand nothing;' for, I put it to you, what could I have said clearer, and yet made so as no one else could understand? It seemed to me that I'd just hit the mark, and the next thing was to get it to him.

Who'd ever have thought, I says, that that long doubling-up chap, as we all made such fun of with his little birds, would have turned in so useful; and then I got what you big people call moralising about everybody having their use on earth, without it was mutineers, whose only use seemed to me to be finding work for the hangman.

I got no chance to send my note that day, through people being about; next day, too, nothing came of it; but early the next morning, soon after daybreak, I got my little messenger out, tied the paper to his wing with a bit of worsted out of my kit, and then going on deck, I let him fly; but so as not to take the attention of the chap at the wheel, I started him from up in the main-top, where I made-believe to have gone to have a smoke.

There was a watch of three forward, but they were all half asleep; while as for him taking his trick at the wheel, he kept on nodding over his job, and letting the ship yaw about till she went anyhow.

Bless the pretty little thing! When I first opened my hand, it only sat there looking at me with its bright beady eyes, and then it was so tame, it hopped upon my shoulder, to stay a few seconds, before flitting from rope to sheet and shroud, lower and lower, till it perched upon the cabin skylight, and rattled out a few clear crisp notes, like a challenge to its master, who, I felt sure, would be asleep. My only hope was that the little thing would flit through the big hole I made, and stay in the cabin till Tomtit was up.

But I was wrong, for the bird had no sooner sung its sweet note, putting one in mind of old boyish days when we used to go bird-nesting, than I saw a hand thrust up through the broken light, and after a little fluttering, the bird let itself be caught, when, knowing that my job was done, I came slowly down, and walking aft, stood and talked to the chap at the wheel.

'Hollo!' I says, all at once, 'there's one o' my birds got loose;' and running forward, and making a good deal of fuss, I captured the little linnet, for it never flew far at a time, having been tamed and petted by Mr Butterwell till it was almost like a little Christian.

That day I watched my chance, and got hold of what powder I could, making a little packet of it

in my silk neckercher; and when it was dark, I managed to drop that through the skylight as I went whistling along the deck. Next thing to be done was to get some weapons, for it seemed strange to me if we six true men couldn't somehow make one chance and turn the tables on the rascals who had taken the ship. Counting them up, I found there was about seventeen—long odds enough, unless we could trap half of 'em, and fight 'em a part at a time. Then I thought the odds would be fair, for fighting with right on our side, I considered that we were quite as strong as eight of the others.

But the job was to get hold of weapons, for they never let neither me, nor Sam, nor Bill Smith have neither cutlash nor pistol, only take our turn at the wheel, or trim sails, otherwise we were treated right enough. Some of the chaps grumbled, saying, that now Van had made hisself captain, times were as hard as they were before; but that wasn't the case, though now he'd got the ship, he didn't mean to lose her again if he could help it, and seemed to me to be always on the watch for everything. As to trusting either of we three to go down below with rations, that was out of the question, either he or Brassey attending to that, and more than once I heard high words, and Mr Bell talking in a threatening way when Van was below.

Now, if it had been at any other time, we should not have sailed a hundred miles without being boarded by some one; while, if a Queen's ship would only have overhauled us now, it would have been salvation for us: but no; day after day slipped by, and not a sail came near. All I had managed to drop more into the cabin was only a couple of table-knives; when one dark evening, as I lay under the bulwark, hid by a bit of sail, I saw Van come out of his cabin, go and talk to the chap at the wheel, see to the coursing of the ship, and then go forward. I heard him talk to the watch for a minute, and then he went below forward, when, running upon all-fours, I was at the cabin hatch and down below in a jiffy.

As I expected, there were plenty of pistols and cutlashes there, where he had had them put for safety; and if I could have opened the big cabin door, I might have pitched half a score in before any one could have said 'Jack Robinson;' but there was something to stop me, for I had crossed the room and had my hand on a cutlash before I knew that Brassey was in the cabin with his head down upon the table, and seemingly fast asleep.

I should think I stood there with my hand stretched out for a full minute, not daring to move, expecting every moment that Van would come back, or else that Brassey would wake up.

That minute seemed to be stretched out into quite an hour; and then feeling that it was now or never, I shoved one after the other six pistols inside my shirt, when taking another step to reach where some swords stood together in a corner, I knocked one down, when I threw myself on my hands and knees, so that, if Brassey started up, he would not see me at first. Then as I lay there trembling with anxiety, I heard him yawn, push the lamp a little further on the table, and a minute after, he was snoring loud.

I waited as long as I dared, and then rising lightly, I got hold of one cutlash, and then of five more, out of a good twenty as stood there; stuffed as many cartridges out of the arm-chest into my pockets as they would hold; and then, after doing all this by fits and starts, expecting every moment that Brassey would hear me, I turned to go.

I 'd crept across the cabin, and reached the door, when I heard a step on the deck, and drew back; but the next moment it had gone, and after waiting for a minute, with the cutlashes tightly held under my arm, I made another start, when my heart seemed to sink, for I heard a sort of husky cough I well knew, and Van had his foot upon the stairs.

There was only one way for safety, and that I snatched at, for in another few seconds Van would have had me by the throat, and all would have been over; but, darting back, I laid hold of the lamp, dashed it down upon the sleeping man's head, and then leaped aside.

MEDIEVAL BOOKBINDING.

The Egyptians, as every one knows, wrote on the papyrus, a kind of rush, growing in the swamps adjacent to the Nile, strips of which were fastened together till the required breadth of surface was obtained. A great deal of this was required, for copies on papyrus of the funeral ritual were placed in every mummy-case. To make the paper, the Egyptians cut off the two extremities of the stalk, slit it, and peeled off the skins. These were placed one above another transversely, and stuck together by the water of the Nile; and finally, beaten with a mallet, and polished by a tooth or shell. When required to last long, they rubbed it with oil of cedar. The botanical name for the papyrus is *Cyperus antiquorum*, and it is called *berd* by the modern Egyptians. It grows to the height of about ten feet, surmounted by a downy flower. On monuments of the reign of Chephren and Cheops, men are represented bearing bundles of this plant.

According to Varro, before the time of Alexander the Great, the Greeks used palm-leaves, linen, or wax. Papyri were exported from Egypt; but the trade was stopped by the rivalry of the kings of Egypt and Pergamus. Ptolemy Philadelphus, king of Egypt, prohibited the exportation of the papyrus, in order to prevent Eumenes of Pergamus increasing his library; but the latter caused the skins of sheep to be dressed and used for writing upon; this was called *pergamena*, hence *pergament* and *parchment*. *Biblos* was a kind of bark used for books in Greece, as well as papyrus and *liber*. The inner bark of the lime was used in Italy for the purpose. We get our word *book* from the Danish *boek*, beech-bark, on which writings were made at an early period. The Roman books up to the time of Augustus were in the form of scrolls (*volumina*), wound round a stick named *umbilicus*, the extremities of which, richly ornamented, were the *cornua*. The outside of these *volumina* were often of appropriate colour to the subject treated of in the roll; thus, those relating to war were *red;* to voyages, *blue*, &c. The manuscripts of the rolled-up form dug up at Herculaneum and Pompeii have no trace of decoration. In some instances the Romans used leaves of lead, which had been beaten thin with a hammer, and also leaves of wood covered with wax, connected at

the back with rings. Books of this kind have been found at Herculaneum, and may be considered the rude original of the modern book.

Martial, in his *Epigrams*, tells us that works could be had in an elegant case or *binding* for five denarii (about three shillings of our money). He says it took only *one* hour to copy the whole of his second book of *Epigrams*. Respecting the cheapness of books then, we must remember that slaves executed vast numbers, and their food only cost twopence-halfpenny per day of our money. Horace allowed his slaves a pound of a kind of common corn, a little wine, oil, and salt. Mr Humphreys says that a rapid writer was able in less than twelve hours to produce a copy of a poem equal in extent to Tennyson's *Enoch Arden* and its accompanying poems. The square form of book began to prevail in Rome, in imitation of tablets. These tablets were afterwards made of leaves of vellum, and the covers of ivory were richly embellished. Square books began to be generally adopted in the fourth century. A copy of Virgil in the Vatican in this form has been assigned to the reign of Septimius Severus. The Romans had superb libraries, adorned with portraits of deceased *literati*, with cases reaching to the roof, called *loculamenta*, with shelves and holes for the rolls. The number of books destroyed in the Alexandrian Library was about five hundred thousand volumes. Josephus refers to a copy of the Law sent to Ptolemy Philadelphus, which was written in letters of gold upon skins so artfully put together that the joinings did not appear.

In the middle ages, the libraries were much smaller. Before the year 1300, the library of the university of Oxford consisted only of a few tracts, chained or kept in chests in the choir of St Mary's Church. At Glastonbury, in 1248, there were only four hundred volumes, and that was the first monastery in England. In 1364, the Royal Library of France did not exceed twenty volumes. When the Abbot of Gambleurs had collected one hundred volumes, he imagined he had a fine library. The monastery of St Serfan, an island in Loch Leven (Kinross-shire), possessed only sixteen books, and yet the prior, Andrew Wintoun, in 1420, completed his *Orygynale Cronykil of Scotland*, a valuable specimen of ancient manners. The finest library we read of in the fifteenth century was that of Corvinus, king of Hungary (died 1490), who had thirty thousand volumes, a great many of which were bound in brocade, with bosses and clasps of gold and silver.

It seems extraordinary that with the difficulties the monks had to contend with, they should have produced masterpieces of illumination, which we cannot equal, much less excel. 'If you want a rubber,' says an old treatise on Illumination, 'you must take a dogge's toothe, and set him in a sticke.' They made their own brushes from minever tails, set in quills, or often perhaps from the hair of the conventual tom-cat. They extracted their colours from plants and minerals, which the lay brethren ground; and made the vellum from the skins of animals slaughtered for their food. It is certain that in the eleventh and twelfth centuries the skins were prepared in the monasteries, and the process is described by Archbishop Hildebert of Tours in his sermon on the *Book of Life*. But this parchment was not equal to that supposed to have been imported from the Moors in Spain. In the fourteenth and fifteenth centuries, it was bought in its manufactured state, as the monastic rolls of accounts testify. Generally, in a volume, one set of scribes wrote the work, and the illuminators added the initial letters, &c. But it is on record that Henry, a monk of the Abbey of Clyde, in 1178, wrote and illuminated a volume, and even made the brass bosses of the binding with his own hands. When finished, the volume was bound generally between two boards covered with skins, or richly ornamented with plates of gold and silver set with crystals and rubies. Ecclesiastics were forbidden to hunt, but Charlemagne granted permission to priests to indulge in the pleasures of the chase if they did so to procure deer-skins for binding their books.

The Book of the Gospels, or Text, was generally bound in the most sumptuous manner, and decorated with the symbols of the four evangelists. An example, in the Vatican, containing the Gospels of St Luke and St John in golden letters, is covered on one side with a leaf of ivory, artificially wrought with carved work, in which is seen a figure in a toga, holding in the left hand a book, with the right in benediction: it is supposed to be of the time of Charlemagne. The same emperor gave to the monastery of Arrianæ a Text, the covers of which were enriched with amber and carved ivory. Lothaire, king of France, in 855 offered to the monastery church of Pruyan, where he embraced the religious life, 'a Book of the Gospels in ivory covers, inlaid with gold, and set with crystals and jewels.' The early Irish manuscripts were often splendidly adorned, as well as the silver *cumdhachs* or cases in which they were contained. Ethenwolf, in a metrical epistle to Egbert, at that time resident in Ireland for the purpose of collecting manuscripts, extols one Ultan, an Irish monk, for his talent in adorning books. In Anglo-Saxon and Irish bindings a piece of crystal or beryl is made their chief ornament. In some instances, this piece of crystal (usually shaped into a convexed oval) is of so large size as to take up the whole side of the cover, and readily suggests the propriety of calling it a 'glass book' (*Archæologia*, vii. 167). Dr Rock thinks this custom was derived from the Druids. The term 'æstel' employed in King Alfred's translation of Pope Gregory's *Liber Pastoralis*, was probably this boss of crystal: 'To every bishop's see in my kingdom I will that one (of the copies of his own Anglo-Saxon translation of the Pastoral) be sent; and upon each there is an *æstel* which is about fifty mancuses (in value), and I bid, in God's name, that nobody that æstel from these books shall undo.' The Durham Book, or St Cuthbert's Gospels, in the British Museum, is surpassed only by the celebrated Book of Kells, that exquisite example of early Irish art. Bishop Eadfrith, successor to St Cuthbert, caused the book to be illuminated to his memory. It was encased in a splendid binding of gold, set with precious stones, by Bilfrid, an anchorite at Tyninghame, in East Lothian, the most skilful binder in Northumbria. St Dunstan was very celebrated for the beautiful manner in which he bound books. In the Stowe Catalogue, the ancient silver binding of the celebrated Irish Service-book is figured. In *The Church of Our Fathers*, by Dr Rock (279, 287), a notice will be found on the style of bookbinding among the Anglo-Saxons. St Margaret, queen of Scotland, one of the last of the Anglo-Saxon

princesses, bestowed a cover glistening with gems on her highly illuminated copy of the Four Gospels. The volume was interleaved with fine glossy silk, such as may sometimes be met with even now between the leaves of later illuminated manuscripts. In Dugdale's *History of St Paul's*, we find mention made of eleven Texts or Books of the Gospels, all richly bound, belonging to that cathedral. The texts were placed in shrines (*camisiæ*) often of silver and gold. Salisbury Cathedral had (1222) a Text bound in solid gold, ornamented with twenty sapphires, six emeralds, eight topazes, eight alemandine stones, eight garnets, and twelve pearls. In the year 1315, Canterbury reckoned as many as seven Texts, bound in gold and precious stones (Dart's *Cant. Cath.*, App. p. 7). A fine specimen of this style of binding in silver parcel-gilt, formerly belonging to Dr Butler of Shrewsbury, is now in the British Museum.

Alcuin, an industrious English monk, occupied himself from 778 to 800 A.D., that is, twenty-two years, in making a copy of the Bible for Charlemagne. This was afterwards purchased by the British Museum for L.750.

Of course, bound in this way, and artistically illuminated, these books were the most valuable gifts a monastery could offer a prince; and in the opening page of the volume, we often see a representation of the author presenting his book to the king or nobleman. Thus, in *The Shrewsbury Book* in the British Museum, Talbot, Earl of Shrewsbury, is presenting his book to Henry VI., who is seated on his throne, and surrounded by his courtiers. Richard de Bury, Bishop of Durham (1333–45), was a great bibliomaniac. He bought of the Abbot of St Albans a Terence, a Virgil, a Quintilian, and a sermon against Rufinus, together with thirty-two other volumes, for fifty pounds of silver. In the reign of Edward III., one hundred marks (or one thousand pounds) were paid to Isabella de Lancaster, a nun of Ambresbury, for a book of romance purchased from her for the king's use. The richest covers were sometimes made double, so that when a secret spring was touched, the outside boards opened, and displayed the inward magnificence. Eleanor, Duchess of Gloucester, mentions, in her will in 1399, 'a chronicle of France in French, with two clasps of silver enamelled with the arms of Burgoyne; a book containing the Psalter, Primer, and other devotions, with two clasps of gold enamelled with the arms of France; and a Psalter richly illuminated, with the clasps enamelled with white swans, and the arms of my lord and father enamelled on the clasps.' In the accounts of the wardrobe of Edward IV., we find that Piers Banduyn was paid for 'binding, gilding, and dressing' two books twenty shillings each, and sixteen shillings each for four others. Now, twenty shillings then would be twenty pounds of our money. He also had six yards of velvet, six of silk, with tassels, gilt clasps, and nails supplied to him. The British Museum gave seven hundred pounds for a missal and case of Italian work, *c.* 1580, ornamented with rubies, emeralds, and azure enamel, supposed to have belonged to Henrietta Maria, queen of Charles I.

Libraries were often kept in towers, for superior seclusion, in early periods. The books were arranged on the shelves with the edges outside. In *Noontide Leisure* (i. 38, 39), we read: 'This room [at New Place], which Shakspeare called his own, had, together with an eastern aspect, a pleasant look-out into the garden, and was very neatly fitted up in the Gothic style with carved oaken presses, well stored with books, of which the leaves, and not the backs, being placed in front, and these decorated with silken strings, and occasionally with gold and silver clasps, in order to confine the sides of the covers, not only contrasted well with the dark hue of the oak, but gave a light and cheerful appearance to the apartment.'

Shakspeare says:

> That book in many 's eyes doth share the glory,
> That in gold clasps locks in the golden story.

Bishop Earle, in his *Microcosmography*, says of a young gentleman of the university: 'His study has commonly handsome shelves, and books neat silk strings, which he shews to his father's man, and is loath to untie or take down, for fear of misplacing.'

In the frontispiece to Dr Boys' *Workes* (Lond. 1623, folio), the author is represented in his study with his books ranged on the shelves, with the edges frontwise. We frequently meet with vellum and parchment-covered volumes in which the vellum overlapped the edges, and the title was written on one of the flaps. But with other books it must have been difficult to find any volume wanted. Sometimes the title was written across the leaves in large letters.

In a book preserved by the town of Southampton (a code of naval legislation, in Norman-French, *c.* 1320), one of the oak boards in which it is bound is much longer than the other, and has a square hole in the lower part, to put the hand through, in order to hold it up while citing the laws in court. In the fifteenth century, books of prayers were often bound thus: the leathern covering of the volume was lengthened beyond the margin of the boards, and then gathered into a large knot at the end; it could then be hung at the girdle. A wood-cut of this arrangement will be found in the second volume of *The Book of Days*, page 339.

In the monasteries, an officer called the 'armarian' had charge of the books. He was expected to see that they were not injured by damp or insects, and especially to look after the bindings; he had also to keep a correct catalogue of them. Ingulphus, of the Abbey of Croyland, speaking of the lending of books, says: 'Our books, as well the smaller unbound volumes as the larger ones which are bound, we altogether forbid.' The scriptorium at St Edmundsbury was endowed with two mills. In Archbishop's Lanfranc's Constitutions (1072), we find an injunction ordering that at the beginning of Lent the librarian was to deliver a book to each of the religious, which was not to be returned till the following Lent; and all who had neglected to read the books were commanded to prostrate themselves before the abbot, to supplicate his indulgence.

The old stamped leather bindings of the fifteenth and sixteenth centuries are often beautifully executed, and exceedingly interesting. Jean Grolier, Viscount d'Aguisi, one of the four treasurers of France (born at Lyon 1479, died 1565), collected a magnificent library, and had the books splendidly bound. In 1675, his library was dispersed. Gascon, the celebrated binder of that time, was chiefly employed by Grolier, but the designs are

said to have been composed by himself in moments of leisure. A wood-cut of one of these bindings will be found in Shaw's *Decorative Arts, Ecc. and Civil, of the Middle Ages*. It had the usual inscription: '*Io grolierii et amicorvm*,' indicating that it was for the use of his friends as well as himself. The collection of Mr Edwards was very rich in these volumes, and large prices were realised. A coloured plate of great beauty will be found in Shaw's work, of a book belonging to the same style and period, though it cannot be proved to have belonged to the Chevalier Jean Grolier. Aldus, the famous printer of Venice, printed the works of Machiavelli in 1540, in four volumes. Grolier had his copy bound in four different patterns, and one volume was sold at the Libri sale for one hundred and fifty pounds. At the same sale, two volumes, which formerly belonged to the library of Diana of Poitiers, beautifully bound, were sold for eighty and eighty-five pounds respectively. The celebrated artist, 'le petit Bernard,' is said to have been employed on them. At the library at Treves is a manuscript studded with heads wrought in fine cameos.

In the middle of the sixteenth century, leaves of paper were pasted together for bindings, wood having been previously used for the purpose. Mr Thoms says the originator of binding in cloth was Mr R. E. Lawson, of Stanhope Street, Blackfriars, formerly in the employ of Mr Charles Sully; and the first book bound in cloth was a manuscript volume of music, which was subsequently purchased by Mr Alfred Herbert, the marine artist. On the volume being shewn to the late Mr Pickering, who was at that time (1823) printing a diamond edition of 'the classics,' he thought this material would be admirably adapted for the covers of the work. The cloth was purchased at the corner of Wilderness Row, St John's Street, and five hundred copies of the Diamond Classics were covered by Mr Lawson with cloth. Shakspeare's plays were also issued in this form, and these works were the first books bound in cloth.

The custom of chaining books to desks in churches is said to have originated from an act of Convocation in 1562, ordering that Nowell's Catechism, the Articles, and Bishop Jewell's Apology should be taught in universities and cathedral churches. But the custom has been traced back as far as Sir Thomas Lyttleton, who, by his will, dated 1481, ordered some of his works to be chained in different churches. St Bernard, in 1153, in one of his sermons, actually alludes to some such custom.

It is probable that there was no specimen of velvet binding before the fourteenth century. In the will of Lady Fitzhugh, *c.* 1427, several books are bequeathed: 'I wyl that my son Robert a Sautre covered with rede velvet, and my doghter Mariory a Primer cou'ed in rede, and my doghter Darcy a Sauter cou'ed in bleu, and my doghter Mal de Eure a Prim'r cou'ed in bleu.' Queen Elizabeth had a little volume of Prayers bound in solid gold suspended by a chain at her side. The Countess of Wilton, in her *Art of Needlework*, says the earliest specimen of needlework binding remaining in the British Museum is Fichetus (Guil.) Rhetoricum, Libri tres (Impr. in Membranis), 4to, Paris ad Sorbonæ, 1471. It is covered with crimson satin, on which is wrought with the needle a coat of arms, a lion rampant in gold thread in a blue field, with a transverse badge in scarlet silk: the minor ornaments are all wrought in fine gold thread. The next in date in the same collection is a description of the Holy Land, in French, written in Henry VII.'s time. It is bound in rich maroon velvet, with the royal arms, the garter and motto embroidered in blue; the ground crimson; and the fleurs-de-lis, leopards, and letters of the motto in gold thread. A coronet of gold thread is inwrought with pearls, the roses at the corners are in red silk and gold. In the Bodleian Library is a volume of the Epistles of St Paul (black-letter), the binding of which is embroidered by Queen Elizabeth; round the borders are Latin sentences, &c. Archbishop Parker's *De Antiquitate Britannicæ Ecclesiæ* (1572), in the British Museum, is richly bound in green velvet, embroidered with animals and flowers, in green, crimson, lilac, and yellow silk, and gold thread. In the same collection is a Bible bound for James II., shewing on the cover his initials, J. R., surmounted by a crown, and surrounded with borders of laurel, the four corners being filled with cherubim.

The writer of this paper once saw at Broomfield, in Essex, a Bible which belonged to Charles I. (date 1529, Norton and Bell printers). It is a folio, bound in purple velvet; the arms of England richly embroidered in raised work on both sides, and on the fly-leaf is written: 'This Bible was King Charles the First's; afterwards it was my grandfather's, Patrick Young, Esq., who was library-keeper to his Majesty; now given to the church at Broomfield by me, Sarah Attwood, Aug. 4th 1723.' It is a relic little known.

Various kinds of insects, popularly called bookworms, do much injury to books. A mite (*Acarus eruditus*) eats the paste that fastens the paper over the edges of the binding, and loosens it. The caterpillar of another little moth takes its station in damp old books, between the leaves, and there commits great ravages. The little boring woodbeetle also attacks books, and will even pierce through several volumes. Mr W. R. Tymms mentions an instance of twenty-seven folio volumes being perforated in a straight line by the same insect, in such a manner, that by passing a cord through the perfectly round hole made by it, the twenty-seven volumes could be raised at once.

A TWILIGHT PICTURE.

'Tis a sweet Sabbath eve in summer-time,
And lovers twain, with hand enclasped in hand,
Upon a flower-hemmed meadow-pathway stand,
Beside a stile they care not yet to climb.
Before them spread fair uplands crowned with pine,
That, sharply on the amber sky defined,
Stand up black-green against it; while behind,
A wood's dark edge with strongly pencilled line
Curves round a hill. Fair is the sylvan scene,
And oh! so sweet the tender twilight hour—
So sweet, and yet so sad. A silvery sheen
Falls like an after-thought on leaf and flower;
And such deep calm abounds, the very air
Breathes low and faint, like one engaged in prayer.

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